

developing the exposed wafer.

REMARKS

This application has been carefully reviewed in light of the Office Action dated September 23, 2002 (Paper No. 6). Claims 2 to 15 are in the application, with Claims 2 and 3 being independent claims. Reconsideration and further examination are respectfully requested.

The drawings were objected to for not containing reference symbols mentioned in the specification. Applicant respectfully submits that the objection is in error and should be withdrawn. In particular, the symbols S_1 , S_3 , S_4 are mathematical variables of mathematical equations which are discussed in the specification. These mathematical variables are not reference signs and are not required to be described somehow in a drawing pursuant to 37 C.F.R. § 1.84(p)(5).

Figs. 22 and 23 were objected to for not being disclosed in the specification. Applicant submits that these figures are described, *inter alia*, at page 21, line 21 to page 23, line 18 of the specification.

In view of the foregoing, reconsideration and withdrawal of the drawing objections are respectfully requested.

Claim 1, which was rejected under 35 U.S.C. § 101, has been cancelled without prejudice or disclaimer of subject matter and without conceding the correctness of its rejection. Accordingly, withdrawal of the Section 101 rejection is respectfully requested.

Claims 2 to 15 were rejected under 35 U.S.C. § 112, second paragraph. In response, Applicant has carefully reviewed and amended Claims 2, 3, 8 to 10, 12 and 13 to attend to the issues raised in the Office Action. Accordingly, withdrawal of the Section 112 rejection is respectfully requested.

Claims 2 and 3 were rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 5,487,963 (Sugawara); and Claims 4 to 15 were rejected under 35 U.S.C. § 103(a) over Sugawara in view of U.S. Patent No. 5,455,116 (Nagano). Reconsideration and withdrawal of these rejections are respectfully requested.

The present invention as recited by Claim 2 concerns a method of manufacturing a two-dimensional phase element which includes the steps of forming a first etching mask in a checkered pattern on a substrate; and performing an etching process by using the first etching mask.

The present invention as recited by Claim 3 also concerns a method of manufacturing a two-dimensional phase element. The method includes the steps of forming a first etching mask in a checkered pattern on a substrate; forming segments of multiple levels at a portion not covered by the first etching mask; forming a second etching mask corresponding to an inversion of the first etching mask; removing the first etching mask; and forming segments of multiple levels at a portion not covered by the second etching mask.

Thus, according to one feature of the invention, a first etching mask is formed in a checkered pattern on a substrate. By virtue of this feature, a two-dimensional phase element can be formed with greater accuracy, thereby increasing the optical performance of the element.

Suguwara is not seen to teach or suggest at least the foregoing feature.

Fig. 1 of Suguwara shows a phase shifting mask having first light transmission areas (10) of a square shape and second light transmission areas (11) of a square shape disposed alternately in two perpendicular directions in a light shielding area (12). However, this phase shifting mask does not have a checkered pattern.

This is in contrast to the present invention. For example, in the embodiment shown in Fig. 3, the etching mask (21a) has a checkered pattern.

Although Nagano teaches that his metallic layer (E) may have a checkered pattern (see col. 7, lines 45 to 49), Applicant submits that there is no motivation or suggestion in the applied art to modify Suguwara's phase shifting mask to include this feature. It is only Applicant's own specification that suggests the desirability of manufacturing a two-dimensional phase element by forming a first etching mask in a checkered pattern. Modifying Suguwara's phase shifting mask with the teaching of Nagano would be an impermissible hindsight rationalization of a result now deemed desirable but nowhere hinted at in the applied art. The prior art must, without the benefit of Applicant's specification, provide a motivation for making the necessary changes in a reference. See MPEP § 2143.01.

With regard to the invention as recited by Claim 3, neither Suguwara nor Nagano is seen to disclose the feature of forming a second etching mask corresponding to an inversion of the first etching mask.

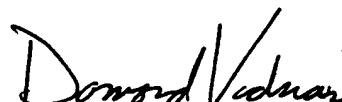
Applicant therefore concludes that the applied references do not teach or suggest the claimed invention either singly or in the combination proposed by the Office

Action, even assuming that such combination can properly be made. It is therefore respectfully requested that the Section 102 and Section 103 rejections be withdrawn.

No other matters being raised, it is believed that the entire application is fully in condition for allowance, and such action is courteously solicited.

Applicant's undersigned attorney may be reached in our Costa Mesa, California office at (714) 540-8700. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

2. (Twice Amended) A method of manufacturing a two-dimensional phase [type] element comprising the steps of:

forming a first etching mask in a checkered pattern on a substrate; and
performing an etching process by using the first etching mask [as a reference].

3. (Twice Amended) A method of manufacturing a two-dimensional phase [type] element comprising the steps of:

forming a first etching mask in a checkered pattern on a substrate;
forming segments of multiple levels at a portion not covered by the first etching mask;
forming a second etching mask corresponding to an inversion of the first etching mask;
removing the first etching mask; and
forming segments of multiple levels at a portion not covered by the second etching mask.

8. (Twice Amended) A method according to Claim 2 or 3, wherein the substrate [contains] comprises quartz.

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9. (Twice Amended) A method according to Claim 2 or 3, wherein a reticle having an optical proximity effect correcting pattern is used to form the first etching mask having a checkered pattern through photolithography.

10. (Twice Amended) A method according to Claim 2 [or 3], wherein the etching process is carried out by use of the first etching mask and [an] another etching mask which is formed by a resist.

12. (Twice Amended) A method according to Claim 2 or 3, wherein the method is usable to produce one of a phase [type] computer generated hologram, a two-dimensional binary structure, and a phase modulation plate.

13. (Twice Amended) An illumination system including a two-dimensional phase [type] element manufactured in accordance with a method as recited in Claim 2 or 3.